**AP STAT: Ch. 19 notes NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**CONFIDENCE INTERVALS: For single sample proportions**

* From Ch. 18…. Distribution of sample proportions () follows the model: (if checks pass)
* However, most of the time we don’t know…
* We take samples and calculate \_\_\_\_\_\_\_ in order to try and find \_\_\_\_\_\_\_\_
* ***Since we don’t know p, we can’t find the standard deviation***
* \_\_\_\_\_\_\_ is the **estimate** for \_\_\_\_\_\_\_\_
* So… we can estimate the std. deviation with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
  + SE =

**CONFIDENCE INTERVALS… Intro**

**EXAMPLE:** It is election season. You open the newspaper and see a headline: ***57% of the nation favors the Democratic candidate for President.***

1. Does EXACTLY 57% of the nation favor the Democrat? Why?
2. As you keep reading, you see the following: ***There is a margin of error of 5%***. What does this mean about the TRUE PERCENT of the nation that favors the Democrat? Do you think that the pollsters have a really good idea of how many people will vote for the Democrat on Election Day?
3. As you keep reading, you see the following: ***The results of this poll are given with 70% confidence.*** Do you think that their results are reliable? Why?
4. What if they change their confidence to 95%? Do you think that their results are reliable? Why?
5. What if the results are as follows: 57% will vote Democrat, margin of error of 15%, 99% confidence. What can you say about the results? Are they reliable? Why?

**CONFIDENCE INTERVALS… The basics:**

* Based on …
* Start with \_\_\_\_\_\_ and give ourselves \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Size of the interval (of the MOE) is based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Larger sample size =
  + Larger confidence level =
* Basic Setup:
* Specifically, for 1-proportion sample:
* Z\* =
* 3 main confidence levels:
* Other confidence levels… how do we find Z\*?
* **SENTENCE INTERPRETATION:**

**CONDITIONS:**

If all conditions are met, then we can say that has the model:

And we can use the Normal Model for the 1-Prop Z-interval

Example: We want to know the real improvement rate for a new medication. We conduct an experiment and find that out of 53 subjects, 27% of them report improvement with the new medications. Create a 95% confidence interval (and interpret).

Example: We take a simple random sample of 95 Bucks county residents and find that only 20 of them approve of a new property tax to pay for repairs to local roads. Estimate with 99% confidence the true percent of people who approve of the tax.

**MORE ABOUT MARGIN OF ERROR:**

Things that affect MOE (margin of error):

*If we want a particular MOE, we can set a level of confidence and a sample size in order to attain that MOE.*

**Example:** Let's go back to our example about the improvement rate with a new medication. We found 27% improvement. How many subjects would we need in a new experiment to make a 98% conf. interval while still keeping a 5% MOE?

***NOTE:*** If you are not given a value of, you can use \_\_\_\_\_\_\_\_\_\_\_\_\_

**Example:** What sample size must be used to estimate the outcome of a political election with a margin of error of 3% and 99% confidence?

**Example:** What sample size must be used to estimate the true percent of left-handed people in the nation with 90% confidence and a margin of error of 8%? Assume that it has been shown in previous research that the percent of left-handed people was 38%.